Electronic Version
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Claims

[c1] 1. A method for noninvasive ECG detection and diagnosis, comprising the following steps:
.acquiring high-resolution ECG data from a patient;
processing said acquired data in accordance with two or more different ECG analysis algorithms; and
deriving a prediction score for a particular clinical end point as a function of the respective results of said two or more ECG analysis algorithms.

[c2] 2. The method as recited in claim 1, further comprising the step of training a predictive model with clinically confirmed data for both input and output, wherein said predictive model is used for said prediction score derivation.

[c3] 3. The method as recited in claim 1, wherein said particular clinical end point is sudden cardiac death.

[c4] 4. The method as recited in claim 1, wherein said particular clinical end point is sustained ventricular tachycardia.

[c5] 5. The method as recited in claim 1, wherein said particular clinical end point is ischemia.

[c6] 6. The method as recited in claim 1, wherein said ECG analysis algorithms comprise late potential, T wave alternans and QT dynamicity algorithms.

[c7] 7. The method as recited in claim 1, wherein said ECG analysis algorithms comprise QT dispersion and intra-QRS algorithms.

[c8] 8. The method as recited in claim 1, wherein said ECG analysis algorithms comprise heart rate variability, QT dispersion and QT dynamicity algorithms.

[c9] 9. The method as recited in claim 1, wherein said data acquisition step uses the X, Y and Z leads of a Frank lead system.

[c10] 10. The method as recited in claim 9, wherein one of said ECG analysis algorithms is a T wave alternans algorithm comprising the following steps:
dividing the high-resolution ECG data into even beat and odd beat groups;
averaging beats in said even and odd beat groups separately;
determining the variance of T wave morphology of all even beats for each of said X, Y, Z leads;
determining the variance of T wave morphology of all odd beats for each of said X, Y, Z leads; and

determining the variance of T wave morphology between even and odd averaged beats for each of said X, Y, Z leads.

[c11] 11. The method as recited in claim 9, wherein said data acquisition step also uses leads of a standard 12-lead system.

[c12] 12. The method as recited in claim 11, wherein one of said ECG analysis algorithms is a QT dispersion algorithm comprising the following steps:
computing a respective QT dispersion value for each of a multiplicity of successive segments of 12-lead ECGs; and computing an mean or median value of said QT dispersion values.

[c13] 13. A system for noninvasive ECG detection and diagnosis, comprising: a multiplicity of electrodes applied to a patient, a data acquisition system for acquiring high-resolution ECG data from the patient; and a processor programmed to process said acquired data in accordance with two or more different ECG analysis algorithms, and derive a prediction score for a particular clinical end point as a function of the respective results of said two or more ECG analysis algorithms.

[c14] 14. The system as recited in claim 13, wherein said pro-

cessor is programmed to use a predictive model for said prediction score derivation, said predictive model being trained with clinically confirmed data for both input and output.

[c15] 15. The system as recited in claim 13, wherein said particular clinical end point is sudden cardiac death.

[c16] 16. The system as recited in claim 13, wherein said particular clinical end point is sustained ventricular tachycardia.

[c17] 17. The system as recited in claim 13, wherein said particular clinical end point is ischemia.

[c18] 18. The system as recited in claim 13, wherein said ECG analysis algorithms comprise late potential, T wave alternans and QT dynamicity algorithms.

[c19] 19. The system as recited in claim 13, wherein said ECG analysis algorithms comprise QT dispersion and intra-QRS algorithms.

[c20] 20. The system as recited in claim 13, wherein said ECG analysis algorithms comprise heart rate variability, QT dispersion and QT dynamicity algorithms.

[c21] 21. The system as recited in claim 13, wherein said data acquisition system comprises the X, Y and Z leads of a

Frank lead system.

[c22] 22. The system as recited in claim 21, wherein one of said ECG analysis algorithms executed by said processor is a T wave alternans algorithm comprising the following steps:
dividing the high-resolution ECG data into even beat and odd beat groups;
averaging beats in said even and odd beat groups separately;
determining the variance of T wave morphology of all even beats for each of said X, Y, Z leads;
determining the variance of T wave morphology of all odd beats for each of said X, Y, Z leads; and
determining the variance of T wave morphology between even and odd averaged beats for each of said X, Y, Z leads.

[c23] 23. The system as recited in claim 21, wherein said data acquisition system further comprises leads of a standard 12-lead system applied to the patient.

[c24] 24. The system as recited in claim 23, wherein one of said ECG analysis algorithms executed by said processor is a QT dispersion algorithm comprising the following steps:
computing a respective QT dispersion value for each of a

multiplicity of successive segments of 12-lead ECGs; and computing an mean or median value of said QT dispersion values.

[c25] 25. A method for noninvasive ECG detection and diagnosis, comprising the following steps:
(a) acquiring high-resolution ECG data from a patient using the X, Y and Z leads of a Frank lead system;
(b) dividing the high-resolution ECG data into even beat and odd beat groups;
(c) averaging beats in said even and odd beat groups separately;
(d) determining the variance of T wave morphology of all even beats for each of said X, Y, Z leads;
(e) determining the variance of T wave morphology of all odd beats for each of said X, Y, Z leads;
(f) determining the variance of T wave morphology between even and odd averaged beats for each of said X, Y, Z leads; and
(g) determining T wave alternans as a function of the results of steps (d)-(f) by analysis of variance.

[c26] 26. A system for noninvasive ECG detection and diagnosis, comprising: a multiplicity of electrodes applied to a patient, a data acquisition system for acquiring high-resolution ECG data from the patient using the X, Y and Z leads of a Frank lead system; and a processor pro-

grammed to process said acquired data in accordance with a T wave alternans algorithm comprising the following steps:

(a) dividing the high-resolution ECG data into even beat and odd beat groups;

(b) averaging beats in said even and odd beat groups separately;

(c) determining the variance of T wave morphology of all even beats for each of said X, Y, Z leads;

(d) determining the variance of T wave morphology of all odd beats for each of said X, Y, Z leads;

(e) determining the variance of T wave morphology between even and odd averaged beats for each of said X, Y, Z leads; and

(f) determining T wave alternans as a function of the results of steps (c)-(e) by analysis of variance.